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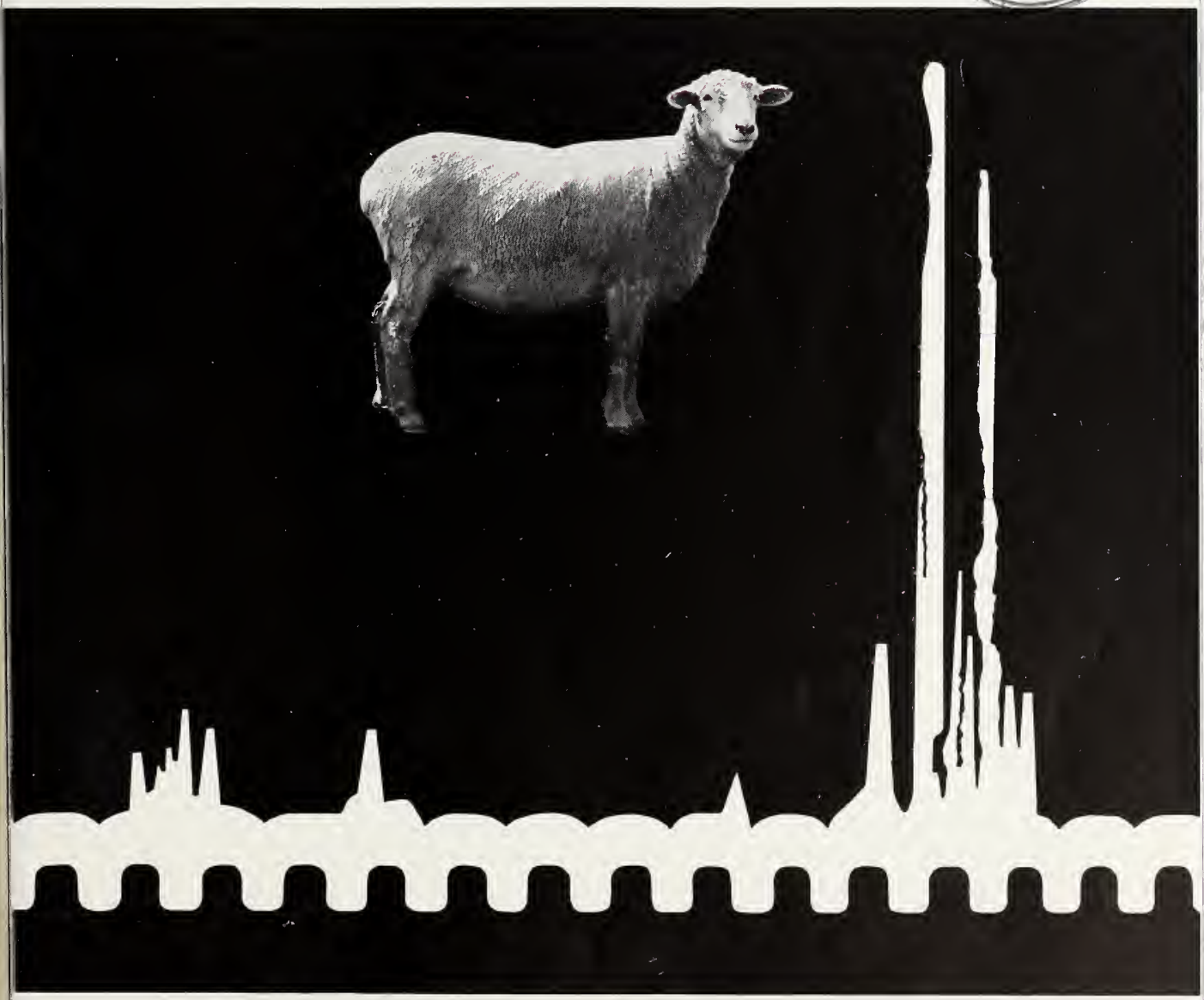

ULTRASONIC ANALYZER DETECTS PREGNANCY • Pages 3 & 4

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Cutting Livestock Costs

Farmers in this country could cut their costs of producing livestock by $1.4 billion per year through the elimination of reproductive inefficiencies.

Now, their herds and flocks fall short of their full reproductive potential because of problems such as sterility, abortions, stillbirths, failure to rebreed promptly, and too few young per litter.

Solving these problems is a goal of ARS animal husbandry research.

Each year, reproductive failures add $526 million to the costs of beef production, $561 million to milk production, $114 million to production of poultry and eggs, $124 million to pork production, and $69 million to lamb and wool production; because:

- Twenty percent of all beef cows fail to calve.
- The average calving interval for dairy cows is 13.2 months. ARS scientists consider a 12-month interval possible. Five percent of all dairy cows fail to calve, and 5 percent of all calves are born dead.
- Hatching eggs that fail to produce chicks or poults amount to 20 percent in laying hens, 30 percent in broilers, and 40 percent in turkeys.
- Fifteen percent of all sows fail to farrow, and 9 percent of all pigs are stillborn.
- From every 100 ewes, sheepmen get 95 lambs per year. ARS scientists consider 170 possible.

Current research is a start toward cutting these costs (see pp. 3, 4, 5, 15, and 16). Needed, as well, is new or continuing research toward:

- Reducing age of first breeding of female livestock.
- Improving breeding activity of male livestock.
- Controlling breeding periods of female livestock.
- Improving fertility and preservation of semen, especially for hogs, sheep, and poultry.
- Increasing numbers and conception rates of ova.
- Developing ways to fertilize, store, and grow ova.
- Developing methods for early pregnancy diagnosis.
- Reducing deaths before, at, and after birth.
- Reducing intervals between births.
- Controlling sex.

Scientists consider these realistic objectives. Attaining them will help achieve the ultimate goal—complete reproductive efficiency for all livestock.

Editor: R. P. Kaniuka
Managing Editor: H. K. Street
Contributors to this issue:
V. E. Bourdette, H. L. Brinson, E. H. Davis, D. W. Goodman, M. E. Haun, M. B. Heppner, L. D. Mark, D. H. Mayberry, J. G. Nordquist, D. W. Warren, D. M. Webb

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Orville L. Freeman, Secretary
U.S. Department of Agriculture

G. W. Irving, Jr., Administrator
Agricultural Research Service

A group of Morlam ewes diagnosed as pregnant awaits the lambing season. The foundation for the new Morlam strain, the ewes were selected because they approached year-round fertility (Photo No. ST–1062–22).

MORLAM

MORE LAMBS

ARS Developing Strain to Provide Lambs Every Eight Months

8 8

ARS SCIENTISTS are producing a crop of lambs every 8 months at Beltsville, Md., with a new strain of sheep called "Morlam" (more lambs) and a new system of sheep breeding.

Top Morlam ewes have produced two lambs per pregnancy or six lambs in 2 years—the goal of the project.

By selective breeding, the researchers hope to develop in the Morlam strain such economically important characteristics as year-round multiple births, long wool, hornlessness, and white, open faces.

In farm flocks, sheep normally lamb once a year. However, a ewe carries her lamb to term in about 5 months, and doesn't need to nurse it for more than 2, so in theory she could complete three terms every 2 years. A production cycle of 8 months, rather than the usual 12, could increase the lamb crop by 50 percent.

The 8-month cycle presents problems, however, ARS sheep geneticist C. E. Terrill points out. Sheep generally do not come into heat between February and July, and they reach peak fertility in September and October. Thus, lambs generally are born in early spring when there is plenty of pasture to supplement milk from their mothers.

Breeds of sheep and individuals within breeds vary in their ability to propagate beyond the usual season. Rambouillets, Merinos, and Dorsets probably come closer to year-round fertility than other breeds.

Since 1961, Terrill and geneticist G. M. Sidwell have been selecting individual ewes that could breed in spring as well as in the fall.

These Morlam ewes are bred in April, August, and December, and lambs come in September, January, and May.

With an ultrasonic analyzer applied to pregnancy diagnosis by sheep researcher I. L. Lindahl (see accompanying story), Terrill and Sidwell check ewes for pregnancy 2 months after breeding. If a ewe is not pregnant, it can be rebred with the next group without breaking the rhythm of 8-month lambings. In conventional sheep breeding, failure to conceive during the breeding season delays lambing 12 months—or three times as long.

Even with just one lambing a year, however, the Morlam strain would provide the advantage to a farmer of supplying lambs at a season when they will bring a premium or when extra labor for lambing is available.

First-generation ewes of the Morlam strain are still producing in the flock and haven't accumulated lifetime records. Thus, Terrill and Sidwell say, it's too early to evaluate the overall progress of the program. ■

I. L. Lindahl, sheep nutritionist, prepares to photograph a reading on the ultrasonic analyzer. Animal caretaker Dale Harper holds the probe in front of the udder, the best location for pregnancy detection. In routine checks, one man can hold the probe and read the analyzer (Photo No. ST–1062–10). Pictured are readings for ewes that are pregnant (Photo No. PN–1397) and not pregnant (Photo No. PN–1398).

For Morlam Project . . .

ULTRASONIC ANALYZER DETECTS PREGNANCY

THE ULTRASONIC ANALYZER used at Beltsville, Md., can accurately detect pregnancy in sheep 2 months after breeding—a feat impossible for even experienced sheep producers.

Safe for both ewe and lamb, the analyzer is available commercially. Sheep producers using it could rebreed nonpregnant ewes promptly and feed the extra grain needed by pregnant ewes.

ARS sheep nutritionist I. L. Lindahl applied the ultrasonic principle to pregnancy diagnosis. The analyzer was adapted from the Naval sonar device that detects submarines and determines ocean depths by sending sound waves through the ocean until they hit a solid object and bounce back.

When used on sheep, the sound waves pass through flesh instead of water. In pregnant ewes, the waves bounce back when they hit the placenta or fetal tissue and register a round trip of 36 cm. In ewes that are not pregnant, the waves probably bounce off the ewe's intestines and register a round trip of only 12 cm.

Lindahl considered various methods before finding one adaptable for routine use with sheep. Techniques used to detect pregnancy in humans were inaccurate or too complex for sheep; palpation, an examination technique commonly used for cows, is not feasible because the ewe is too small; electrocardiograms of ewes were difficult to interpret; X-rays required expensive equipment and were a potential danger to the fetus; and examination of internal organs was accurate but involved surgery which could imperil the ewe's health.

The ultrasonic analyzer has been more than 90 percent accurate in detecting pregnancy in ewes. A ewe classified as pregnant that doesn't lamb the next season may not always have been mistakenly identified. Lindahl says. She may have been pregnant when diagnosed but miscarried before the lambing season.

A new operator can learn to separate pregnant and nonpregnant ewes in a short time, but practice is required for high accuracy. Three trained men can analyze 15 sheep per hour.

After refining techniques and instrumentation, Lindahl hopes to be able to identify the number of lambs a ewe is carrying. If farmers give special care to ewes carrying more than one lamb, more live multiple births should result.

Goat producers might also profitably use the ultrasonic analyzer. Most goats continue to milk well for 2 years without being rebred. By accurately detecting pregnancy in goats, the analyzer could prevent a goat producer from halting milk flow of goats that later turn out not to be pregnant. ■

For Beef Cattle Raisers . . .

BETTER CALF CROPS

RESEARCH BY ARS and State experiment stations shows that. through good management, beef cattle producers can increase profits by insuring that cows come into heat promptly, conception rates are high, and a large percentage of calves are born healthy.

Findings summarized below suggest a threefold program of planning, feeding, and breeding:

PLANNING

Nature sets limits that leave time for only a short breeding season, if it is to come at the same time each year. On most ranches, the breeding season lasts from 90 to 120 or more days. ARS trials, however, show that a season of 40 to 45 days is possible—and 60 days should be within every cattle breeder's reach. Such a season would provide calf crops that are more uniform for feeding and more salable.

First-calf heifers should be bred before mature cows since they generally take longer to come into heat after calving. Heifers should be bred no younger than 15 months. Angus and Shorthorns should weigh 550 to 600 pounds. and Herefords should be about 50 pounds heavier for breeding.

Heifers which are not thrifty at weaning should be culled then, as should first-calf heifers that have not been bred successfully after 40 days.

FEEDING

Young heifers need properly balanced rations. from weaning onward, to achieve the proper weight before breeding. Concentrates added during the last 2 months before breeding hasten puberty by almost 16 days, but when given only during the last 2 to 3 weeks before breeding, concentrates provide little benefit.

Young heifers need at least 6 pounds of TDN per day and 0.8 pounds of protein to start cycling normally. In a test group of 32 heifers, 14 attained a single heat period on 3 to 4 pounds of TDN per day. But after cycling one or two times, 8 of the 14 heifers stopped showing heat.

Adding concentrates to a heifer's ration before calving usually gives greater benefits than adding extra feed only during lactation. Unless extra energy is provided, heifers will not come back into heat promptly for rebreeding after first calving.

Older breeding stock should get about 16 pounds of TDN per day to gain rapidly after calving and before the next breeding season. Cows, however, should not be allowed to get extremely fat. Cows that have been fed properly but remain unbred for more than 40 or 45 days should be culled.

BREEDING

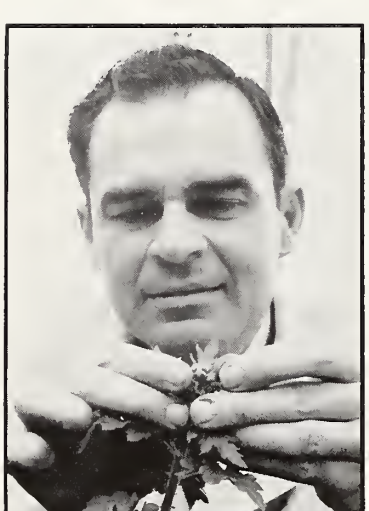
Crossbreeding produces heifer calves that show first heat one-half to 2 months sooner than the combined average of their parent breeds. Within a given breed, calves that receive adequate rations will reach puberty about the same time, regardless of which bull sired them.

Certain bulls decrease calving difficulty by siring small calves. Crossbreeding itself does not help avoid difficult deliveries.

Researchers have had some success in predicting calving difficulties in heifers that first calve at 3 years of age, by measuring the pelvis. In heifers first calving at 2 years, these measurements were of little value. ■

Steers at Beltsville, Md., all calved at about the same time, are a uniform lot for feeding (Photo No. ST–772–11).

OIL SPRAY
Helps Develop Big, Beautiful Mums



Horticulturist H. M. Cathey examines the lateral bud of a chrysanthemum (Photo No. ST–876–8).

FLOWER GROWERS may eventually use a petroleum product—rather than hand labor—to produce the big, attractive chrysanthemums used widely as cut flowers or potted plants.

The big blooms develop from the terminal (top) bud of the chrysanthemum plant after the lateral (side) buds have been removed. Removing lateral buds by hand is one of the most time-consuming and tedious jobs in chrysanthemum growing.

ARS scientists have found, however, that a naphthalene-base oil in emulsion form, sprayed on chrysanthemum plants after the terminal buds are completely formed, causes partly formed lateral buds to abort. Terminal buds are not affected, and develop at the same rate as those of plants that have had lateral buds removed by hand.

While the method has promise, horticulturist H. M. Cathey points out that much additional research is needed before it can be considered for commercial use. Tests are now underway to determine which fractions of the petroleum product cause the lateral buds to abort, and their relationship to other known growth inhibitors.

Research on the use of the oil to stop lateral bud growth grew out of insect control studies conducted at Beltsville, Md., in 1964 by entomologists G. V. Johnson and F. F. Smith, and engineer A. H. Yeomans. They found that naphthalene used as an insecticide solvent injured lateral buds of certain chrysanthemums without harming the terminal buds.

In more recent tests, Cathey, Smith, and Yeomans found that the response of chrysanthemums to oil treatment depends on the stage and rate of flower growth, the variety treated, the amount of oil used, and the agent used to emulsify the oil.

Oil spray is applied to a chrysanthemum plant to prevent development of lateral buds (Photo No. ST–876–5).

If applied too early, while the plant is producing vegetative growth, the treatment kills the growth point and no flowers are produced. If applied too late, after lateral flower buds have completely formed, the treatment is ineffective. At some dosages, the treatment causes leaf distortion.

The responses of chrysanthemum of different varieties varied greatly. One major commercial variety, Fred Shoesmith, showed the best response. With some varieties, lateral buds were aborted only partly or not at all. Two major varieties, Shasta and Improved Indianapolis Yellow, were unaffected at all dosages tested.

The scientists are not sure why the oil causes flower buds to abort, but believe it may kill all tissues with high rates of cell division, including those that initiate flower buds.

Other known growth inhibitors, the scientists found, were not effective on flower buds of chrysanthemums. They tested dilute auxin sprays used to reduce the number of flowers on fruit trees; and maleic hydrazide, Chloro-IPC, and methyl esters of fatty acids used to control lateral buds on tobacco plants. ■

Chrysanthemum on left, of the popular variety Fred Shoesmith, had lateral buds removed by hand. Plant in center did not have lateral buds removed, so failed to develop single large bloom favored by florists. Plant on right received oil treatment to prevent development of lateral buds (Photo No. ST–876–13).

gases kill storage insects

Entomologist A. F. Press, Jr., measures quantity of nitrogen and other gases in jar of insect-infested peanuts (Photo No. PN–1388).

NITROGEN AND CARBON DIOXIDE may someday supplement pesticides and fumigation chemicals for killing insects in stored crops as a result of ARS research.

In tests at Savannah, Ga., entomologists A. F. Press, Jr., and P. K. Harein found that when air in large bottles was replaced by nitrogen, red flour beetles lived for about 9 hours and Indian-meal moth larvae, about 21 hours. In carbon dioxide atmospheres, red flour beetles lived for about 12 hours and Indian-meal moth larvae, about 24 hours.

Scientists now plan tests on a larger scale to determine the effect of these and other gases on storage insects and on the quality of stored grain and other products.

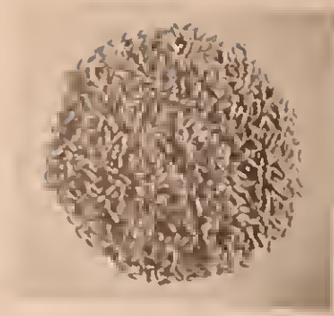
Using gases such as nitrogen and carbon dioxide would have several advantages over the use of fumigation in stored grains and of pesticides with peanuts. Fumigation chemicals and pesticides may be hazardous to people applying them. In addition, fumigation requires airtight storage facilities and a trained operator in constant attendance for long periods.

Nitrogen or carbon dioxide, however, would not be hazardous to the operator and would leave no residues. Airtight storage facilities would not be necessary if the gases were released continually in controlled amounts and, once the operation began, the gases could be released and regulated automatically.

The use of nitrogen or carbon dioxide might be competitive in cost with some fumigants.

Differences in the relative humidity of the gaseous atmospheres may be one reason the insects in the Savannah tests died faster in nitrogen than in carbon dioxide. Relative humidity of the nitrogen atmosphere was 12 percent and that of the carbon dioxide, 26 percent.

Nitrogen does not kill all storage insects as fast as the red flour beetle and Indian-meal moth. In earlier tests with another flour beetle, nitrogen killed about half of the insects within 36 hours—still faster than some fumigation procedures. In atmospheres with some oxygen remaining, insects lived 7 days before suffocating. ■



Wheat (shown here), oats, barley, rice, and rye can be used to make tempeh (Photo No. PN–1389).

The wheat is now ready to be mixed with cooked soybeans for fermentation (Photo No. PN–1390).

After fermentation, the wheat-soybean tempeh is sliced for cooking (Photo No. PN–1391).

Agricultural aide C. R. Martin cracks wheat—the first step in making tempeh. (Photo No. PN–1392).

Biochemist H. L. Wang freeze-dries wheat-soybean tempeh (Photo No. PN–1393).

FROM TRADITIONAL

Indonesian Tempeh...

SIMPLE, UNIFORM PROCESS PRODUCES NEW HIGH-PROTEIN FOODS

THE INDONESIAN SOYBEAN FOOD, tempeh, can now be made by a simple, uniform process adapted from traditional methods—and with cereal grains as well as soybeans. The result may be new convenience foods for the United States, and a new high-protein food for developing countries.

Scientists at ARS' Northern utilization research laboratory at Peoria, Ill., have developed cereal and cereal-soybean tempehs that may be baked, deep fried as chips, or used as ingredients in such foods as soups. They could also be manufactured as snacks or made at home as staple foods in countries where protein is scarce.

In continuing research to find new uses for farm products, scientists developed a simple, rapid process for making soybean tempeh in 1962.

Now, microbiologist C. W. Hesseltine, biochemist H. L. Wang, and microbiological technician M. L. Smith are using that process to make tempeh from wheat, oats, rice, barley, rye, wheat-soybean mixtures, and rice-soybean mixtures.

Further tests are expected to show whether cereal-soybean tempehs contain protein with a better balance of amino acids than either soybeans or cereals alone. Tests to date indicate that wheat tempeh has more vitamins, niacin, and riboflavin but slightly less thiamine than wheat.

Tempeh, like bread and cheese, is made by the action of microorganisms such as molds. To make soybean tempeh with uniform flavor and taste, the scientists isolated and identified each strain from five species of the mold *Rhizopus*, from Indonesian tempeh. They found that only one of the five soybean tempeh mold species produced enzymes that make satisfactory cereal tempeh.

For centuries, Indonesians have made tempeh by first soaking the soybeans overnight, then treading on beans to loosen hulls, letting hulls float away, boiling beans about 30 minutes, and drying in a flat bamboo tray.

In modernizing tempeh making, the scientists use machines to crack, dehull, and cook the beans or grains. To make a combination soybean-grain tempeh, the beans and grains are cracked and cooked separately and then mixed in a fermentation tray.

The Indonesians use small bits of tempeh from a previous batch to inoculate the cooked, cracked beans with mold. This mixture is wrapped in banana leaves, or packed in the halves of a split bamboo stem. The mixture is fermented for 1 or 2 days at room temperature and then eaten.

The scientists, however, inoculated their mixture with one pure strain isolated from the mold that they found made the most satisfactory tempeh. Thus, they have a uniform product. This mixture is fermented for 20 to 24 hours at 85 to 90 degrees F.

The resulting tempeh is white to brown depending on the mixture of cereals and soybeans. Some tempehs have yeasty aromas similar to that of fresh bread. The fresh tempeh can be sliced, seasoned, and fried, or frozen and stored.

In earlier tests, soybeans were fermented in plastic bags, cellophane tubes, and metal and wooden trays. Plastic bags best preserved the fresh flavor of tempeh. For storage, the scientists say, dehulled, cooked soybeans could be inoculated with mold, packed in plastic, and kept for as long as 4 weeks. They could then ferment at room temperature. ■

HIGH-PROTEIN MIXTURE FOR BABIES

תיים

A nurse at the Hasharon Hospital feeds the mixture to one of the infants volunteered by parents for Matoth's studies (Photo No. BN–27241).

From P.L. 480 Research in Israel . . .

BABIES LIKE THE taste of it. Made from low-cost ingredients available throughout the Middle East, it may provide new markets for U.S. soybeans and chick-peas.

It's the new protein-rich vegetable mixture developed by biochemist Karl Guggenheim, Hadassah Medical School of Hebrew University in Jerusalem, Israel, under a Public Law 480 research grant awarded by ARS. Such grants are made from local currencies paid by countries that receive U.S. surplus food.

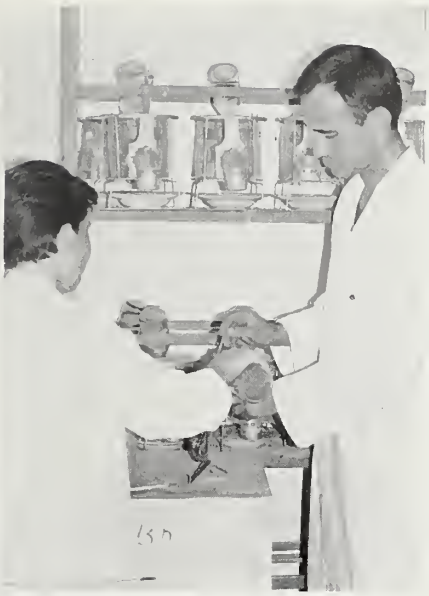
Guggenheim tested various vegetable mixtures and found the best to be a mixture of 47 percent steam-heated chick-peas, 35 percent defatted sesame flour, and 18 percent heat-processed low-fat soybean flour. This mixture has a nutritive value higher than that of any one of its ingredients. It is high in essential amino acids, B-vitamins, calcium, and iron.

Yehuda Matoth, head of the Pediatrics Department of the Hasharon Hospital at Petah-Tiquah, Israel, taste-tested the vegetable mixture by feeding 20 infants small amounts mixed with sugar and water to give it the consistency and the calorie and protein content of milk mixed with cereal. The infants liked the taste of the mixture and suffered no gastrointestinal disorders from it.

Matoth is now feeding infants the mixture as their sole source of nutrients. but these studies are not yet advanced enough for definite conclusions.

Guggenheim fed the mixture to young rats and chickens for 2 years. Protein-depleted rats fed the mixture for 10 days gained 0.07 ounce in weight for every 0.03 ounce of protein consumed. For young chickens, the nutritive value of the protein mixture was superior to fishmeal, cottonseed meal, and soybean meal.

Guggenheim is continuing experiments to improve the mixture by supplementing it with additional amino acids. ■



Laboratory technicians A. Dayan (left) and S. Szmelcman weigh the protein mixture before they feed it to the young rats in the wire cages. In the tests with rats, the nutritive value of the protein is expressed as the ratio of weight gain to protein consumed (Photo No. BN–27238).

Szmelcman uses the spectrophotometer to assay one of the amino acids in the mixture (Photo No. BN–27237).

Experimental Machine Combines Operations in Cotton Planting

ARS agricultural engineers are developing a machine that could save time and labor for cotton farmers by doing five planting jobs at once.

The experimental machine prepares the seedbed; plants a given number of cotton seeds, precisely spaced; sprays to control soil insects and weeds; fertilizes; and applies a mulch to create proper soil moisture for seed germination and growth—all in one operation.

O. B. Wooten and F. E. Fulghum built their machine to combine jobs that formerly required separate trips through the field. Although the machine is still being tested and not available commercially, they believe it could be adapted for use by farmers.

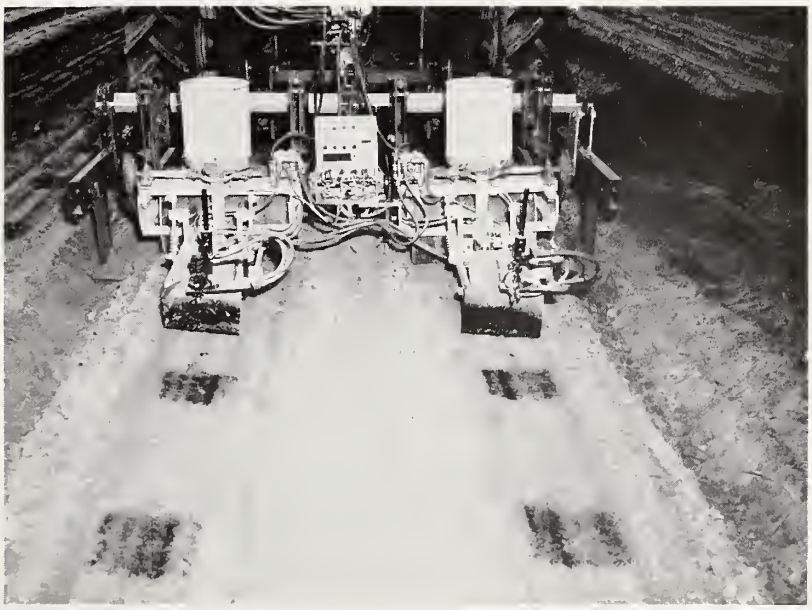
Precision planting, the engineers believe, would also eliminate the need for thinning cotton. Plants would all emerge and mature at the same time, thus saving time and labor in mechanical harvesting.

Since the machine places soil pesticides where needed, its use could reduce substantially the amount of chemical material needed and reduce drift and residue hazards.

For their machine, Wooten and Fulghum added multiple-spraying systems, air compressor, and automatic controls to a two-row cotton planter. The machine is mounted behind a tractor, which provides the power to operate it.

In tests at Stoneville, Miss., the machine has performed successfully. The engineers are continuing their tests and making further refinements. ■

The automatic controls between the two white seed hoppers regulate the operations of the versatile two-row planter-sprayer (Photo No. PN–1394).



Chemist W. S. Singleton adjusts bench scale equipment used to purify egg yolk lecithin for use as the emulsifier in the cottonseed oil emulsion developed at ARS' Southern utilization research laboratory (Photo No. PN–1395).

Developed at Southern Utilization Laboratory . . .

HIGH-CALORIE FAT EMULSION HAS PROMISE FOR INTRAVENOUS FEEDING

ARS SCIENTISTS are developing a nourishing fat emulsion, capable of providing up to eight times as many calories as the carbohydrate solutions now used for intravenous feeding. The new emulsion could help overcome a basic problem—preventing weight loss by patients who must be fed intravenously for long periods.

The new product—made from cottonseed oil—has proved successful in experimental testing with laboratory animals. Dogs, rats, and rabbits were used in tests for reactions such as adverse changes in blood pressure, temperature, body tissue, or organs.

Even when used in doses several times greater than considered normal, the emulsion caused a minimum of undesirable side effects as compared with previous experimental emulsions. When given in large infusions over long periods of time, weight gains were satisfactory.

The U.S. Army Surgeon General will conduct clinical evaluation of the emulsion, which will be made in large batches by the Harvard University School of Public Health.

The Surgeon General provides funds for research at ARS' Southern utilization research laboratory at New Orleans to improve intravenous feeding solutions.

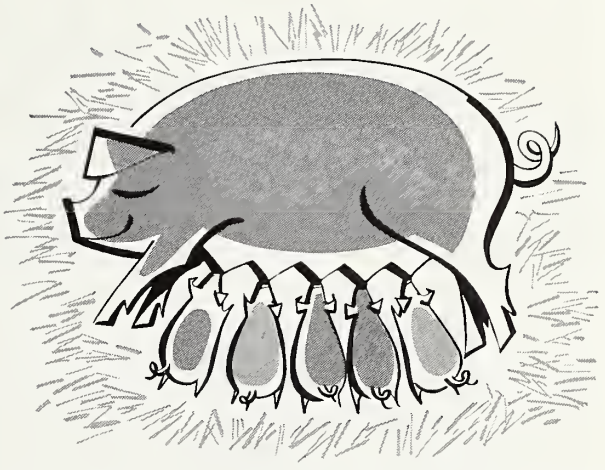
In their search for a safe fat emulsion, ARS chemists W. S. Singleton, M. L. Brown, H. J. Zeringue, J. L. White and M. S. Gray prepared and tested six different vegetable oils, processed in a wide variety of ways. They finally settled on purified cottonseed oil, which they had carefully processed in the laboratory at room temperatures to remove pigments, free fatty acids, and other minor components. This oil is clear, colorless, and odorless.

The emulsifying agent is another critical part of the intravenous feeding solution. For this use, it must be nontoxic and capable of keeping the cottonseed oil in tiny droplets about one-half millionth of an inch in diameter. The scientists have achieved greatest success with a specially purified egg yolk lecithin, a waxy substance long used as an emulsifier in a less pure form.

To make a typical emulsion, the ARS chemists dissolve 10 grams of pure lecithin in an equal weight of ethyl alcohol and add it to 200 grams of the specially processed cottonseed oil. They then remove the alcohol and add the lecithin-oil mixture to 790 grams of distilled water containing 2 percent glycerol. The mixture is emulsified with violent agitation and then homogenized, bottled, sealed, and sterilized. The emulsion may be used immediately or may be held in long-term storage. ■

Discovery by ARS Veterinarians . . .

pregnant sows may transmit HOG CHOLERA



ARS FIELD AND LABORATORY veterinarians have found that a sow exposed to hog cholera virus during pregnancy may transmit the virus to her unborn pigs without showing evidence of illness herself. The pigs, thus, carry the virus when they are born, may become ill, and may transmit the disease to other susceptible hogs.

The discovery supports experiments in this country and in England that demonstrated that hog cholera transmission might be associated with pregnancy.

The new ARS findings may help locate previously unexplained sources of infection, since scientists formerly believed that hog cholera was spread mainly by contact of susceptible pigs with infected animals or contaminated surroundings.

The discovery also emphasizes the need for disposal of *all* exposed hogs in order to eradicate the disease.

ARS veterinarian and hog cholera epidemiologist S. H. Young found, after investigating outbreaks in Indiana, that bred sows which had been in contact with field strains of hog cholera virus or with modified live virus vaccines could transmit the disease. Both vaccinated and unvaccinated sows were involved in the outbreaks.

This, scientists say, may be explained by the "immune tolerance" theory. Although immune to the disease, a sow can carry the virus in her blood after exposure and can transmit the virus through the placental membranes to her unborn pigs. The antibody process of the fetus—its defense mechanism—is not yet in operation, so the fetus "accepts" the hog cholera virus as a product of its own tissues. Thus, the pigs are born with hog cholera.

In baby pigs, Young found, the usual hog cholera symptoms and post mortem findings were not present. The disease often developed slowly or appeared in chronic form. Thus, in many cases, hog cholera was not detected until it spread to older susceptible pigs, where it exhibited its usual pattern.

E. A. Carbrey, veterinary virologist at ARS' National Animal Disease Laboratory, Ames, Iowa, isolated and identified hog cholera virus in the baby pigs by use of the fluorescent antibody, tissue culture technique (AGR. RES., December 1963, p. 6). In this test, cell cultures inoculated with tissue suspensions from pigs suspected of having hog cholera are treated with a fluorescent dye combined with antibodies from anti-hog-cholera serum. This dye-antibody combination is attracted to infected cells and these cells are readily distinguished under a fluorescent microscope.

The problem, the veterinarians emphasize, will not occur with every sow exposed to hog cholera virus during pregnancy. Hog producers should take every precaution, however, to protect bred sows from exposure. Sows or gilts should not be vaccinated with modified live virus vaccines during pregnancy. Pigs freshly vaccinated with modified live virus vaccines should be kept away from pregnant sows throughout the gestation period.

Hog cholera transmitted through the sow may cause abortions, stillborn, or weak pigs with various abnormalities, or a high-death rate from birth to weaning. In pigs from older sows which are immune to hog cholera, trouble may develop slowly with a marked increase about weaning time.

Disease agents other than hog cholera virus can also cause similar problems, so thorough diagnostic procedures—including laboratory tests—are necessary to determine the cause.

The target date for a hog cholera free United States is 1972. Nineteen States are now in the final phases of the program. Twelve others—with nearly 65 percent of the Nation's hogs—plan to advance to these final phases before the end of 1966. ■

CORN SUPERIOR TO SORGHUM-SUDAN FOR SILAGE

CORN SILAGE PAID OFF better for fattening steers than silage from sorghum-sudangrass hybrids, researchers at Jeanerette, La., report.

In trials underway since 1964, ARS nutritionist W. L. Reynolds and N. T. Poché of the Louisiana Agricultural Experiment Station found that while sorghum-sudan far outyielded corn, steers made more economical gains on corn silage.

Seeded broadcast in a field without seedbed preparation or subsequent culture, sorghum-sudan produced yields of about 25 tons per acre. In contrast, wide-row corn yielded about 10 tons per acre. Corn silage was harvested in the dough stage and sorghum-sudan silage in the hard dough stage, as recommended.

The forages were fed to steers starting at about 390 pounds and were supplemented at the rate of 3 pounds of commercial concentrate for every 4 pounds of silage. After 140 days, steers fullfed on corn silage gained 0.21 more pounds per day and required 1.45 fewer pounds of feed per pound of gain than steers fullfed on sorghum-sudan silage. Average daily gains were 2.02 pounds on corn and 1.81 on sorghum-sudan.

In 1964, sorghum-sudan silage cost $5 per ton and corn silage $8 per ton. But the cost per hundred pounds of gain on corn silage was $18.37; on hybrid sorghum-sudan, it was $20.74. ■

FOR BETTER PERMANENT-PRESS GARMENTS

UTILIZATION SCIENTISTS are developing a method for blending chemically treated and untreated cotton fibers to produce garments that wear longer and keep their creases longer than permanently pressed garments now on the market.

In tests at ARS' Southern utilization research laboratory at New Orleans, trouser cuffs made of fabric produced by the experimental process came through eight times the number of washings and tumble dryings as cuffs made by a conventional wash-wear process. The experimental fabric remained sharply creased.

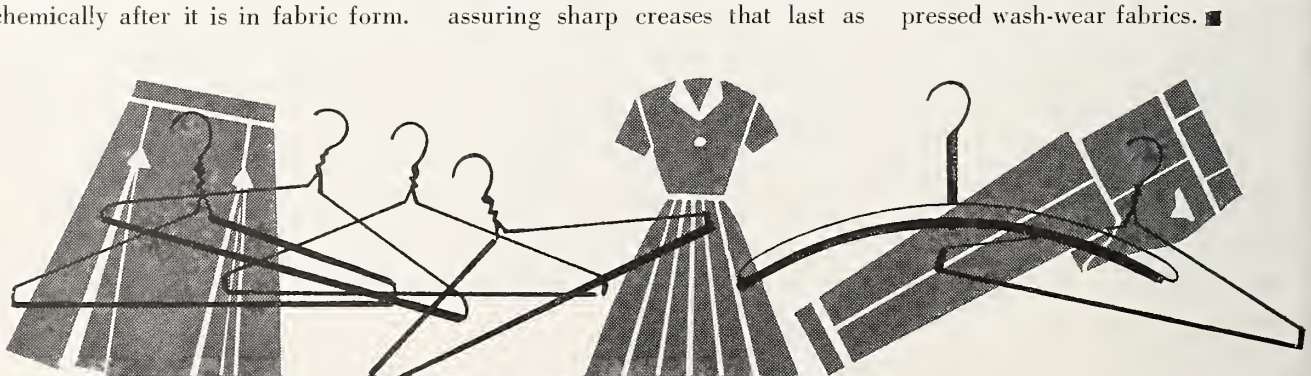
At present, all cotton for permanently pressed garments is treated chemically after it is in fabric form. In their experimental method, the scientists treat some of the cotton before mechanical processing and then blend it with raw, untreated cotton.

Cotton becomes capable of keeping a crease through repeated launderings when chemicals are activated by temperatures of about 300° F. causing changes to take place within the individual fibers.

In the new process, the fibers to be treated are wetted in the chemical solution and very carefully dried at temperatures far below those that cause chemicals to react with the cotton. Thus the heat treatment, called the "cure," can be delayed until after garments have been made and ironed, assuring sharp creases that last as long as the garment.

To date, chemical engineers N. B. Knoepfler and H. L. E. Vix and cotton technologists E. C. Kingsbery and R. J. Cheatham have found that fabrics containing about equal amounts of treated and untreated fibers give the best results. They have found no major problems in treating cotton fibers or in spinning and weaving the blends, but are intensively studying a problem with excessive shrinkage.

In the future, the scientists will work toward finding the best methods of treating the fibers and determining which blends give the highest resistance to abrasion and possess all the desirable properties of permanently pressed wash-wear fabrics. ■



AGRISEARCH NOTES

Simultaneous Farrowing

A synthetic compound called MATCH can effectively bring groups of sows into heat at the same time for simultaneous breeding.

Its use, if officially approved, could make artificial insemination of hogs practical. It would help control baby pig diseases by preventing the disease buildups that result from continuous farrowing, and would promote orderly marketing.

MATCH was tested on more than 1,500 sows in nationwide field trials at ARS and State research stations and supervised tests on privately owned farms. Results were as good as those of previous tests with limited numbers of sows (AGR. RES., September 1965, p. 3).

Conception rates and number of live births were just as good as those achieved under present hog management.

In one large-scale trial at Miles City, Mont., 127 young sows farrowed in groups of 20 to 30 within 6 weeks. About 77 percent came into heat in a 24-hour span during the fifth and sixth day after the end of treatment. Most of the others came into heat within 2 or 3 days of this target period.

Over 80 percent of the sows conceived at first breeding. Litters averaged nearly 10 pigs.

Test data are being evaluated by the Food and Drug Administration which must approve MATCH before it can be released to farmers.

New Range Seeder

An experimental range-seeding machine being developed by ARS agricultural engineers may help Western ranchers establish grasses on soils too difficult to seed with existing machines.

The new machine, developed at Bushland, Tex., and called the Bushland range seeder, can seed in extremely heavy soils, such as clay, and in hard-surfaced (caliche) soils. It performed well in tests with annual weeds, short grasses, mixed perennial grasses, tall grasses, and creosote bushes.

Agricultural engineers R. F. Dudley, E. B. Hedspeth, Jr., and C. W. Gantt designed and built the seeder in cooperation with the Texas Agricultural Experiment Station and the Texas Technological College. Further changes are necessary, they say, before the machine can be adapted for commercial use.

The experimental range seeder has two 18-inch blades to clear an area for seeding. Fertilizer openers—mounted behind the blades—can be readily adjusted to place the fertilizer either below or to the side of the seeded row.

The machine has two pairs of seedboxes—one for large and one for small seeds. It can plant two rows and two different types of seed simultaneously in existing vegetation without seedbed preparation. A press wheel, 1-inch wide, firms a strip of soil over and around the seed in the furrow; a drag chain completes the covering operation.

The experimental range seeder can plant two rows and two different types of seed simultaneously in existing vegetation (Photo No. PN–1396).

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AGRISEARCH NOTES

Funnel for Reviving Pigs

A soft plastic funnel used for mouth-to-mouth resuscitation can restore life to pigs that apparently are stillborn.

Geneticist E. V. Krehbiel developed and used the method to help to reduce losses from apparent stillbirths in an ARS herd at Miles City, Mont., from 9 percent in 1964 to 3 percent this year.

In Krehbiel's method, the flexible polyethylene funnel is fitted tightly over the pig's nose and mouth. Then air is blown into the stem of the funnel, and thus forced into the lungs of the pig.

For the method to be effective, a

pig's heart must be beating and resuscitation must start promptly. Follow these five steps: (1) Hold the pig by its hind legs with head down to drain fluid from its breathing passages. (2) Turn pig with its head up and place funnel over its mouth and nose. (3) Blow forcefully into the funnel. (4) Remove funnel and allow the pig to exhale. (5) Repeat steps 2 through 4, about 15 to 20 times per minute.

After several repetitions, the pig should kick or show another sign of life. Lay the pig on its side or stomach and massage its chest and mouth. It if doesn't start breathing normally in a few seconds, resume artificial respiration. Pigs have been revived up to a half hour after treatment began.

Unexpected and Useful

Unexpected developments sometimes lead scientists to puzzling, but eventually helpful findings.

A case in point is research at the Regional Poultry Research Laboratory, East Lansing, Mich., on the *Rous sarcoma* virus (RSV), one of the agents that cause avian leukosis—a tumorous chicken disease.

ARS microbiologists J. J. Solomon, Richard Reamer, and William Okazaki injected RSV into cells from chicken embryos supposedly resistant to RSV infection. In these embryo cells, they noticed abnormal growth of the type caused by RSV in embryo cells from susceptible chickens.

"We double-checked to see that the eggs we had used were from a resistant stock of chickens—and they were," Solomon says. "Then we checked the virus, and it was the type of RSV we thought it was."

The researchers then started checking other possible causes. Eventually, they found that the abnormal growth was caused by potassium citrate, one of the chemicals used in handling the virus.

"This finding tells us little about how to overcome chicken leukosis," Solomon says, "but it could be of importance in studies of how viruses affect cell growth."

Weed Causes Deformed Calves

A poisonous weed that causes deformed lambs is now known to cause deformed calves and kids as well, ARS research veterinarian Wayne Binns, Logan, Utah, reports.

Previous studies (AGR. RES. August 1964, p. 13, and January 1966, p. 15) had reported that when pregnant ewes ate false helebore on the 14th day of gestation, they gave birth to deformed lambs. If the ewes ate the plant before or after this day, the lambs might be stillborn but not deformed.

False helebore, *Veratrum californicum*, a common range plant in the Western States, is extensively grazed by sheep and goats but is usually not eaten by cattle.

CAUTION: In using pesticides discussed in this publication, follow directions and heed precautions on pesticide labels. Be particularly careful where there is danger to wildlife or possible contamination of water supplies.

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